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MANAGING HETEROGENEITY IN SEARCH-ADVERTISERS' OBJECTIVES

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Abstract

Utilization of search engines services is embedded in many people's daily activities. However, consumers do not pay for these services, they are financed through sponsored search. The prevailing Generalized Second Price (GSP) auction mechanism, which is used by search engine service providers to allocate advertising slots to advertisers, who bid on keywords, only charges advertisers for clicks on their ads. Advertisers who seek exposure and do not want consumers to click on their ads, can manipulate search engines by designing ad content with low click through rates that accumulate free exposures.

This research-in-progress paper presents the motivation behind devising a sponsored search auction pricing mechanism that curtails advertisers' exploitation of search engines, resulting in a better experience for consumers.

The paper analyzes the attributes of sponsored search and shows that the indirect payments by consumers do not necessarily lead to market failure, as opposed to other situations where advertisers sponsor information goods such as national commercial television broadcasting.

Keywords: Information Economy, Attention Economy, Search Engines, Sponsored Search, Pricing of Digital Goods, Digital Business Model.

1 INTRODUCTION

Search engines are one of the most utilized online services. This indispensable service has become embedded in many daily activities people do, be it work, study, dealing with health issues, shopping or leisure (Pew Research Center 2009). Yet, consumers do not pay for using search engine services. The business model of search engine service providers like Google, Yahoo, and Microsoft is based on sponsored search, i.e., advertisers who seek the attention of consumers pay for placing their text ads, in an unobtrusive manner, next to the search results.

Sponsored search has brought search engine service providers billions of dollars in profit (Edelman et al. 2007). However, when consumers do not pay directly for services they consume there is a risk of market failure (DeLong & Froomkin 2000). An intermediary may be able to implement a scheme that benefits all the parties involved: the intermediary (e.g., a search engine service provider), the advertisers, and the consumers. This may be achieved by presenting consumers with relevant targeted ads. Apart from achieving an efficient market, this is important because irrelevant advertising diminishes the value of advertising in general and in the long term it may cause consumers to ignore advertisements in a manner similar to the already prevailing phenomenon of "banner blindness" (Nielsen & Loranger 2006), which is against the interests of the consumers, the search engines, and the advertisers as a whole.

Search engine service providers use an auction pricing mechanism to allocate advertising slots to advertisers who bid on the keywords in queries made by consumers (Battelle 2005, Varian 2009). The prevailing auction in sponsored search is the Generalized Second Price (GSP) auction (Edelman et al. 2007), which only charges advertisers for clicks on their ads. The practical implication of this pricing scheme is that advertisers do not pay for ads that nobody clicked on. However, sometimes advertisers seek exposure and do not want consumers to click on their ad, e.g., in order to advertise their brand name. Such advertisers may manipulate search engines by designing ad content that is not generally relevant to consumers searching for the particular keywords they have bid on, and thus gain free exposure.

The purpose of this study is to devise a sponsored search auction pricing mechanism that eliminates the exploitation of search engines from advertisers who manipulate search engine service providers, causing them to present irrelevant ads to consumers. In this paper we present the motivation of the study. In the next section we explain why sponsored search does not necessarily lead to market failure, as opposed to other situations where advertisers sponsor information goods such as national commercial television broadcasting. The third section presents the challenges of managing heterogeneity in search-advertisers' objectives on sponsored search, and the last section concludes and describes our future work.

2 PERILS OF INDIRECT PAYMENT FOR INFORMATION GOODS

Consumers' lack of willingness-to-pay for digital goods is a well-known phenomenon (Kauffman & Walden 2001, Shapiro & Varian 1999). It is especially hard to charge consumers for online information, since many websites provide free, or apparently free, diversified information services; e.g., news, interactive online games, and professional advice. Furthermore, people do not distinguish between the high production cost of information goods and the very low marginal cost of reproducing this information (Rafaeli & Raban 2003), so they may perceive the price of information goods as "unfairly high".

Another issue that has a major influence on pricing information goods is that they do not always satisfy the excludability assumption, one of the main assumptions of market economy (DeLong & Froomkin 2000). Excludability means that the seller may impose payment for the product or service on the consumer and may prevent consumption from those who do not pay. In certain instances, such as radio or non-cable television broadcasting, whoever has an antenna and a radio or a television, set may consume the broadcasted information content. In these situations it is very hard or nearly

impossible to impose payment. Moreover, information goods usually do not satisfy the rivalry assumption and the same item may be consumed by all those who are interested.

There are adequate trustworthy mechanisms that enable collecting payments for information goods, but usually people are reluctant to pay for them due to the reasons mentioned above. As such, it may be worthwhile for an information goods provider to explore more effective business models. Since direct payment for information goods by those who consume them is hard to accomplish, sponsoring the use of information goods may be necessary to enable their production and their distribution to interested consumers. Sometimes, as is the case of basic academic research, governments pay for these information goods by allocating public funds to universities and research institutes. In other occasions, such as commercial radio and television broadcasting, advertisers pay for exposing their ads to the audience, who consume the information good. In the context of this study, the latter case is of interest because advertisers influence the content of the offered information goods.

It should be noted that advertisers do not necessarily have to be involved in the production of a certain program (which may probably be rarely the case), they indirectly control the content simply by deciding in which programs they would like their advertisements to appear. The indirect financing results in a market failure because programs that attract a small audience, and therefore are not attractive for advertisers, are less likely to be produced (DeLong & Froomkin 2000). If this relatively small audience, which may sometimes comprise of a few hundred thousand people, could have been charged directly for watching the program it would be enough to make the program cost-effective. However, since people are used to getting free information goods it is unclear if they would be willing to pay for such a program, as they might well choose another free program or online activity that also suits their preferences instead.

Search engines are different from other information goods such as the radio and television broadcasts examples described above. So sponsored search may not necessarily result in market failure. We will explain the unique attributes of the search engine service and the accompanying advertisements. For convenience, these attributes will be compared to those of national commercial television broadcasts. However, the analysis is not confined to these two specific information goods and they may be regarded as representing two types of goods, so the implications of this analysis may be generalized to other products with similar attributes.

There are three main stakeholders concerned with sponsored search: consumers, the search engine (broadcaster), and advertisers. Sometimes there is also a fourth group of stakeholders, publishers, who do not have direct contact with the advertisers. An example is Google's AdSense service, where the search engine also serves as an intermediary between advertisers and publishers. However, in this paper, we focus on the main three stakeholders.

In the case of both search and television broadcasts there is the main content and the accompanying ads. The substantial difference between these cases is that the main content of search is determined by the individual consumer, who always gets the required content (i.e., objective search results) irrespective of whether the specific search results were accompanied by sponsored ads or not. So there is no linkage between the content and the advertising revenues that finance it. On the contrary, the content of television broadcasts is determined by the networks and is directly influenced by the potential advertising revenues of the specific program.

Unlike national television networks that provide all audience, or sub-groups within this audience (e.g., a division based on geographic location), with the same commercials, which are irrelevant to most of them, sponsored search enables targeted personalized advertisement, tailored to the current interests of the individual consumer. This distinction is important because unlike untargeted or broadly targeted advertising, targeted advertising can be beneficial to all of the parties involved. Oestreicher-Singer and Sundararajan (2010) empirically examined the impact of Amazon's recommendations to consumers who look for a certain item on their website: "Customers who bought this item also bought...", with data about the demand and co-purchase networks for over 250,000 books and found that the explicit visibility of this co-purchase relationship more than triples the average usual influence that complementary products have on each others' demand. There is a growing trend of businesses that

customize their advertisements and tailor them according to the personal information they have on a particular consumer (Johnson 2009).

Another important distinction between television commercials and sponsored search ads is their level of intrusion, and their load on consumers' attention and time (Davenport & Beck 2001). Whereas sponsored search ads are presented unobtrusively alongside search results and the consumer may choose to read or disregard them, television commercials are imposed on the consumers and waste both their attention and time. The various techniques that enable consumers to avoid commercials are a major evidence of this nuisance. However, these techniques are usually effective for asynchronous content, e.g., a movie, but do not help when consumers watch live broadcasts, like the news, or sports events. Consumers may record news to watch later while skipping commercials but such consumers are deprived of the experience of watching events live.

It is hard to estimate the cognitive load of sponsored search ads on consumers' attention. Currently, sponsored search is a major source of revenues for search engine service providers, which generates billions of dollars of revenues for them, so it clearly demonstrates that these ads are observed by consumers. Moreover, there is some evidence that sponsored search ads that appeared simultaneously in the ads section and in the organic search results increased clicks on both (Yang & Ghose 2009). However a significant proportion of irrelevant ads may cause consumers to gradually learn to ignore search advertising (Nielsen & Loranger 2006). Thus consumers will also disregard relevant ads, shall not click on them, advertisers will not get conversions to their websites, and search engines revenues base would be undermined.

Therefore, it is in the best interest of all the stakeholders that search engine service providers use an efficient auction pricing mechanism that promotes relevant advertising and discourages intentionally irrelevant advertising.

3 THE EXPOSURE MANIPULATION CHALLENGE OF SPONSORED SEARCH PRICING SCHEMES

The purpose of sponsored search pricing schemes is to ensure the efficient allocation of ads to advertising slots. From the consumers point of view it means that the displayed ads will be the most relevant to their specific query and may provide them with helpful content. Presenting the most relevant ads is also in the best interest of search engines because it increases the chances that consumers will click on an ad and that advertisers will pay for clicks.

Apparently, it would seem that advertisers are also interested in clicks on their ads that direct consumers to their website. However, some advertisers may not be interested in clicks, i.e., they have a low value per click and a high value for exposures and may manipulate the auction in order to gain free exposures. Such manipulation is made possible by the pricing scheme currently used by search engines. As the current pricing scheme and its respective allocation takes into consideration, the product of the ad click probability and the value reported by the advertiser, advertisers can manipulate the auction by creating irrelevant ads or ads with low relevance to the possible keyword search. In practice such manipulation leads to allocations in low slots and to a meaningful reduction in clicks. Consequently such advertisers, who their ads are allocated in the low slots, enjoy exposures that are essentially free.

Consider a fictitious example, suppose a well-known chain of baby products whose major share of revenues come from store sales is interested in strengthening its brand name and advertising its new line of baby cloths. The vendor bids on tangentially related keywords such as: car seat, baby stroller, or baby toys. The search auction mechanism learns a low click-through rate on the specific ad, so the baby products chain is unlikely to get the most prominent slots on the webpage. However, the chain's ad will be displayed and consumers will be exposed to the ad's content that could read as follows: "ABC baby products chain has a new line of baby cloths". In pricing schemes, like GSP, that only charge per click, the baby products chain will get free exposure. The search engine service provider

does not get paid and the consumers are flooded with irrelevant information which may divert their mind from their current task.

In the long run, all the stakeholders lose from such manipulations. If consumers experience many incidents of irrelevant advertisements, they will increasingly ignore search advertising, including ads from vendors genuinely seeking clicks. This will lead to a decrease in search engine service providers' revenues and may lead them to seek more intrusive means of advertising that would be less comfortable for consumers.

The challenge search engines face is how to price the sponsored search auction mechanism such that the price matches both the click-seeking advertisers and the exposures-seeking advertisers, or alternatively how to price the sponsored search auction mechanism to discourage the exposures-seeking advertisers from such manipulations.

4 CONCLUSION AND FUTURE WORK

Attention is the scarcest resource in the information overload era (Davenport & Beck 2001). Search engines service providers receive timely information on consumers' focus as their queries reveal their current interest. Therefore search engines are in the best position to provide consumers with effective advertising for the benefit of all parties involved; the search engines, advertisers, and consumers. As the commonly used sponsored search pricing scheme (Generalized Second Price) only charges advertisers for clicks it is susceptible to providing free exposures to impressions-seeking advertisers. Such advertisers game the current scheme for free advertising by designing ads with content that is less relevant to the search queries they target, lowering the chance that a consumer will click on their ad. At present these ads represent irrelevant information for the consumer that damages the overall performance of the auction. Over the long term this practice may lead to users increasingly ignoring sponsored search ads in a manner similar to the well known banner-blindness phenomenon (Nielsen & Loranger 2006).

The possible solution we investigate eliminates the free exposures given to the impressions-seeking advertisers and maintains participation positive utility while allowing impressions-seeking advertisers to enjoy impressions in sponsored search auctions. As described above, it is often the case that impression-seeking advertisers create ads with irrelevant information and damage the overall performance of the auction. In some such cases charging those advertisers for their free impressions may not be sufficient for search engines and a solution that will drive away such advertisers may be desired. We further investigate a pricing scheme that motivates impression-seeking advertisers to leave the auction entirely. The motivation to leave the auction can be made possible by allowing the click-seekers to achieve a positive utility from participating while the impression-seekers achieve negative utility and staying in the auction is no longer a rational strategy for them.

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